phony precludes its potential use for other revenue-producing services and is likely to influence investment decisions made by cable entities. Accordingly, we have included a cost component that represents the use of spectrum on the system.

For backhaul, we have used a figure of $330/home passed as the cost of upgrading a system with fiber to the 2000 homes passed level. These have been allocated to telephony proportionally to the amount of spectrum used for telephone service versus the total spectrum available. Assuming the use of one 6MHz channel in each direction for telephony, and 1GHz of total spectrum, this leads to an allocation factor of 1/80. This leads to a backhaul component of $40 in the model scenario. By contrast, the allocated cost of the remote terminal, which consists only of electro-optical conversion equipment, is small, and has been shown as having no cost.

The customer connection cost includes the following elements:

- the cost of enabling the upstream capability on the coaxial portion of the network;
- a proportional allocation of the cost of deploying coaxial cable to reflect use of the downstream spectrum; and
- the Customer Interface Unit. All have again been determined from figures we have obtained from industry sources.

We have used a figure of $1000/mile to enable the upstream capability, $15,000 per mile to install coaxial cable (with the same 1/80 allocation to telephony) and 200 for the Customer Interface Unit.

CAP Fiber Ring

The cost of backhaul for CAPs stands out due to its magnitude compared to the other technologies. While the per-mile materials and installation costs for a fiber ring are not substantially different than those for a cable network, they are somewhat higher due to their downtown location. However, only a small amount of spectrum is utilized for telephony over cable, while in the case of cellular and PCS, the backhaul costs are for a microwave system, which is relatively inexpensive and also largely distance-insensitive. Consistent with the treatment of other technologies, we have set the interoffice facilities cost to $0 for the CAPs, and allocated the same LEC interconnection costs as we do to the other technologies.

3.7 Comparisons with Industry Benchmark Figures

There are other analyses that have been performed on alternative distribution technologies, leading to per-subscriber cost figures. There are also a few commonly-cited industry "benchmark" figures for such costs. We compare our results with representative examples of such figures, focussing on PCS and cable telephony as the most promising alternative technologies.

A well-known study on the cost of PCS has been done by David Reed[127]. Reed estimates the per-subscriber cost of a radio site to be around $100 per subscriber, considerably lower than our $400 figure. Reed's lower figure, however, fails to reflect the traffic load characteristic of PCS when used to provide fixed-location service as opposed to mobile service. As we have noted before, there is a factor of five difference in the two traffic figures. We showed the dramatic effect this had on per-subscriber costs in the case of cellular radio; similar effects pertain here.

Hughes Network Systems, Inc.[128], has estimated the per-subscriber cost of applying their "E-TDMA" system to fixed-location telephone service. Their estimate, which includes all but one of the components we have considered in our analysis, is $852. The one component Hughes excludes is the Customer Interface Unit (CIU). Adding our projected cost of $300 for that unit yields a total of $1152, which is close to our figure of $1100. It should be noted that the Hughes analysis attributes somewhat higher costs to the radio site, and somewhat lower costs to switching. We have been able to rationalize those differences in terms of differences in the assumed scenarios.

A figure commonly cited by the cable industry for adding cable telephony to a cable system that has already been fiber-enhanced is $300 per subscriber;[129] Scientific-Atlanta in particular cites that figure.[130] It considers only the cost of the subscriber unit and the headend unit — no switching or wire center costs. It should therefore correspond to the sum of our Customer Connection and Network Interface Unit components.

The sum of those two categories in Table 2 is in fact $545. The difference can be reconciled as follows. First, the per-customer cost of implementing the upstream capability and the cost of the allocated portion of the downstream spectrum are, respectively,

127. Reed, *op. cit.*, footnote 123.

128. Hughes Network Systems, *op. cit.*, footnote 124.

129. *See*, e.g., "Will the Broadband Network Ring Your Phone," *Telephony*, December 6, 1993, at 34, and "Cable TV Moves into Local Access," *Lightwave Magazine*, August, 1992, at 1.

130. "Scientific-Atlanta Announces Device for Telephone Delivery over Cable TV," *Cable-Telco Report*, November 22, 1993, at 14.

$100 and $20. Second, we have included $50 for the installation of the subscriber unit. Finally, the cable industry estimate is based on a somewhat lower subscriber usage figure than we have assumed. Our analysis suggests that the effect of the higher usage figure, which causes each unit of the NIU to serve fewer subscribers, is to add $75. Removing all of these differences would reduce our figure to $300, consistent with the industry figure.

3.8 Technology Combinations

In addition to the individual technologies discussed above, various combinations of technologies might also be utilized to provide telephone service to fixed locations. Primary examples include:

(1) PCS on a cable network, with PCS providing the customer connection, and the cable network providing the backhaul facility.

(2) Either cable telephony, cellular/PCS, or the hybrid PCS/cable system providing the premises to exchange switch link, with a CAP fiber ring providing the interoffice facility and/or interconnecting link to the LEC network.

The first of these combinations might be particularly synergistic, as it would allow each partner to focus on the technology with which it is most familiar. It could also be opportune in cases where there was little or no spectrum available for implementing the backhaul circuits on microwave radio, a practice commonly utilized in cellular radio systems today.

Examining this case further, it is evident from Table 2 that the beneficiary would be PCS, which could reduce its backhaul cost from $100 to $40, given that the PCS signal would require at most the same amount of spectrum that cable telephony would require. Although this is not a dramatic amount of savings, it is important again to note that this combination might become more important as microwave spectrum for backhaul becomes less available, and presumably more expensive.

Given that we have assumed the alternative provider utilizes only one exchange switch, so that there is no cost associated with the interoffice facility, it is not clear from this analysis why the second combination would be advantageous. But as penetration grows, requiring more that one exchange switch, or in large metropolitan areas, where even at low penetration there could be advantages to more than one switch, there might be the need for interoffice facilities, and the use of a CAP fiber ring might become economic.

In conclusion, then, there are small but quantifiable advantages to be gained from the

PCS on cable combination, and several possible qualitative advantages associated with both of the combinations considered.

3.9 Sensitivity Analysis

The analysis and results presented heretofore have been based on the following assumptions:

- 100 homes per mile (H/mi.) ("linear density");
- lot sizes of 12,500 sq. ft., or about 1/3 acre, leading to an "area density" of 2,200 homes per square mile (H/sq.mi.);
- a service area containing 80,000 homes;
- 10% penetration level (customers/total residences); and
- all-residential customers.

These characteristics are consistent with the demographics of an area served by a medium-sized cable network. In introducing the model scenario, it was noted that the per-subscriber cost might *a priori* depend on the assumed demographics. This section summarizes the results of a sensitivity analysis which considers the effect of varying these characteristics. We limit consideration to cable telephony and PCS, the two most promising alternative distribution technologies, as determined by their cost and potential ubiquity. The analysis utilizes the same assumptions and calculational techniques discussed before with respect to the base case scenario. Except as noted, all results presented in this section continue to be stated in terms of per-subscriber cost (investment).

We first analyze the sensitivity of various technology component costs to each of these characteristics. We then develop particular scenarios that illustrate the magnitude of the effect that altering such characteristics can have on the bottom line cost of cable telephony and PCS. In doing the latter, we also analyze a scenario that corresponds to the business case discussed in Chapter 5, which assumes a larger number of homes passed and a larger service area than the one we have been dealing with.

Varying the Linear Density of Homes

Since a cable network must run coaxial cable past each home served, the cable telephony customer connection cost depends on the number of miles in the system. For a given number of homes passed, the total miles are determined by the linear density. Based on an earlier study we did of five actual demographic situations, we have considered linear densities ranging from a low of 70 H/mi., representing an up-scale residential or sparsely populated area, to a high of 260 H/mi., for an area primarily consisting of multi-dwelling buildings. The analysis shows that the customer connection component cost varies from $255 to $335, versus the nominal case of $320.

The cost of the PCS remote terminal is potentially impacted by the area density of premises in the following fashion. There is an upper limit on the area that one radio site can cover. The area covered by one site compared to the whole service area determines the number of radio sites required. Since there is a fixed cost associated with the land and buildings (equipment shelter and antenna) at each site, there is a total land and buildings cost that will be dependent on the area served. It is also necessary to deploy backhaul facilities to each radio site, so the total backhaul cost is also affected by the number of sites.

Furthermore, the product of the area density of premises and the penetration level — the area density of customers — influences the number of customers served by each radio site. Since radio equipment must be purchased in units serving more than one customer, there is a lump-sum cost at each site that must be shared by the number of customers served from that site. The cost per subscriber is the ratio of the cost of radio equipment sufficient to serve the number of customers at one site to the number of customers. To the extent, for instance, that customer density is low, so there are fewer customers per site, and the radio equipment increments are large, the per-subscriber cost could be higher than if either the customer density is higher or the equipment increments are lower. Another consideration is that any one site can serve at most 8,000 customers. This upper limit on customers served might lead to a higher number of sites being required than might otherwise be necessary based on the area of coverage limitation.

Although PCS was originally envisioned as consisting of cell sites with a small coverage area — perhaps as low as 200 meters radius — the rules adopted by the FCC will permit considerably larger cell sizes. Our understanding is that there might be systems with cell coverage areas more than four miles in radius. We have assumed a four mile maximum radius to be conservative, and further assumed that a system could be deployed with each cell serving an area this large, then gradually shrink in coverage as increasing penetration causes the customer density to increase. Also, based on our own calculations and the previously-cited paper by Hughes Network Systems, we assume radio equipment can be purchased in increments that serve 800 customers.

The densities in the five areas in our earlier study range from 900 H/sq.mi. to 8,200 H/sq.mi. Holding the penetration constant at 10%, this density variation means both the service area varies, which potentially affects the number of sites for coverage reasons, *and* the customer density varies, potentially affecting the number of sites due to the maximum number of customers served per site. The results of our analysis are that the PCS remote terminal cost varies from $360 to $475 over this density range, versus the nominal case of $400.

Area density can affect backhaul costs for both PCS and cable telephony. Since the

PCS backhaul cost is based on the use of microwave radio, which is relatively distance-insensitive over the distances typical of the distribution areas we are considering, there is no dependence of a *single* microwave system on variation in the PCS backhaul cost. however, since there must be one backhaul link per site, the backhaul costs are affected nonetheless. We find that they vary from $100 to $300 (the model scenario has only one radio site, whereas other scenarios have as many as three).

The cable telephony backhaul cost is distance-sensitive, so there is a dependence on the area served. To estimate the cost effect of this distance dependency, we calculate the area served by the cable system as being equal to 80,000 (the number of homes in the service area) divided by the density of homes. The service area is assumed to be square. If the number of fiber nodes stays constant at one node per 2000 homes,[131] then the average distance from the headend to the fiber nodes grows proportionally to the length of an edge of this square, and hence proportionally to the square root of the service area. Based on this argument, the analysis shows that the cable telephony backhaul cost varies from $20 to $65, versus the nominal case of $40.

Homes in the Service Area ("Homes Passed")

Given that we have assumed the number of homes in the service area is 80,000,[132] and given that there are many cable systems that pass many fewer homes, while some pass an order of magnitude more, the question arises as to whether the results are dependent on the assumed number of homes in the service area. Such a dependence could seemingly be inferred by the analysis of cable telephony backhaul just completed. In reality, however, the various component costs are really proportional to either the number of *customers*, which is determined by the product of homes served and the penetration level, and/or to various distances (or areas). Therefore, since the sensitivity analysis already considers variations in penetration and density, it is not necessary to separately consider the number of subscribers passed. One can extrapolate our results to other situations — for instance, a 30% penetration of 80,000 homes passed gives the same number of subscribers as a 10% penetration of 240,000 homes passed.

Penetration Level

The cost results are based on the assumptions that the system passes 80,000 homes

131. While one could assume that a fiber node should serve a constant area, we instead assume it serves a constant number of homes passed, in order to keep constant the ratio of homes passed to the number of available on-demand video channels and/or telephone lines.

132. The number of homes in the service area is often referred to as the number of *homes passed* by the system.

and achieves a 10% penetration level, and hence serves 8,000 customers. Because most of the component costs consist at least partially of a lump-sum portion, the results can be quite sensitive to the assumed number of customers. To further emphasize this fact, we have calculated the "first customer" cost — that is, the cost associated with decreasing the penetration to zero while holding the other parameters fixed — of each of the technologies. They are as follows:

- $1.9M for cable telephony; and
- $1.3M for PCS.

At the other extreme, if the penetration level is increased to 100%, the per-subscriber costs are as follows:

- $565 for cable telephony; and
- $915 for PCS.

One may observe an interesting phenomenon in these results: while cable telephony has a higher first cost, the incremental cost of adding customers is considerably lower than for PCS, so that at full saturation, the per-subscriber cost is considerably lower for cable telephony.

We have also analyzed costs for a more reasonable range of penetrations — 5% to 30% — with the following results:

- $715 to $1055 for cable telephony, versus the nominal cost of $845;
- $940 to $1200 for PCS, versus the nominal cost of $1100.

Mix of Residential and Business Customers

The model scenario assumes all customers are residential. In fact, however, it is likely that there will be a mix of business and residential customers.

Including business customers has two effects on costs. First, business customers tend to be concentrated, and located in more dense areas. This may lead to some economies; these have in effect been considered in the earlier treatment of distance and density variations. Second, the Busy-Hour CCS is higher for business customers. This tends to increase costs due to the greater per-customer consumption of capacity. This effect occurs in the switching component of both PCS and cable telephony, the remote terminal component of PCS, and the network interface unit component of cable telephony. The analysis shows that net effect on system costs assuming that business customers are 30% of all customers is to increase the cost by:

- $35 for cable telephony; and
- $50 for PCS.

The effect of this business mix is therefore fairly small, although obviously it could be considerably higher in a scenario where business customers dominate.

Scenarios

Based on the foregoing, we have developed three scenarios that demonstrate the composite impact of these various individual effects. The first two have been chosen to demonstrate the maximum variations in cost that can be expected under reasonable conditions.[133] The third represents the situation considered in the business case analysis of Chapter 5. The scenarios are as follows:

Scenario A (Low Cost)

- 260 premises/mi.
- 8,200 premises/sq.mi.
- 80,000 premises in service area (10 sq.mi. area)
- 30% penetration
- all residential

Scenario B (High Cost)

- 70 premises/mi.
- 900 premises/sq.mi.
- 80,000 premises (88 sq.mi. area)
- 5% penetration
- all residential

Scenario C (Business Case)[134]

- 100 premises/mi.
- 2,200 premises/sq.mi.
- 200,000 premises in service area (90 sq.mi.)

133. That is, for instance, we do not consider either 0% or 100% penetration to be reasonable. Nor in the high cost scenario do we consider a mix of residential and business customers, since the low density involved suggests a rural or upscale residential area.

134. The $745 cable telephony is composed of $160 start-up and $585 when a subscriber is added. The $1,030 PCS is composed of $70 start-up and $960 when a subscriber is added.

- primarily residential

Table 3.3 Per-Subscriber Costs for Three Sensitivity Analysis Scenarios		
Scenario	**Cable Telephony**	**PCS**
A (Low Cost)	$660	$940
B (High Cost)	1,130	1,375
C (Business Case)	745	1,030

3.10 Per-Subscriber Cost Estimates

The best case total in the model scenario (as shown on Table 3.2) is $835 for cable telephony. Depending on the treatment of the costs associated with the use of the fiber/coaxial spectrum, this could be reduced to approximately $675. The totals for the other technologies considered are higher. The sensitivity analysis shows a considerable range in this cost, depending on the demographics of the area being served.

Expenses

Beyond capital costs, expenses must also be considered in performing a business case analysis. There are four major expense categories that we have identified:

- LEC interconnection
- Operations
- Signaling (costs associated with use of SS#7 network)
- Powering

The first two of these are considered further in the business case analysis in Chapter 5. We have analyzed the other two to determine if they might represent substantial monthly costs that should be taken into account.

We have expensed signaling under the assumption that an alternative provider will purchase capacity on a SS#7 provider's network rather than purchasing its own signaling components. At the assumed calling rate, and assuming the cost of SS#7 interconnection with the LECs is included in the interconnection charge, so the signaling charge only applies to intra-system calls, the monthly cost per customer is $0.45 at 10% penetration, and $0.90 at 20% penetration. This amount is insignificant compared to the much larger operations and interconnection charges detailed in the business case, and is not considered further.

The estimated monthly power cost per subscriber associated with the added elements of the cable telephony system we considered in detail amounts to only $0.25. A preliminary analysis of the allocation of a share of the costs associated with powering the whole cable system leads to at most a doubling of this figure. Thus this expense, too, is small, and is not considered further.

3.11 Other Candidate Distribution Technologies

In concluding this analysis of alternative distribution technologies, it is worth noting for the sake of completeness that there is one other technology, and one other potential class of providers of an existing technology, which may also turn out to represent viable distribution alternatives. These have not been analyzed herein because their embryonic nature leads to large uncertainties as to their significance, particularly over the next few years.

The *technology* is broadband cellular radio, sometimes referred to as cellular TV. As described in one article,[135]

> In December 1992, the FCC reallocated the 27.5 GHz to 29.5 GHZ microwave band for point-to-multipoint broadcasting distribution, laying the foundation for a new video, voice and data roadway. CellularVision (a patented technology using that roadway) provides the first wireless, two-way integrated broadband delivery of entertainment, information, transactional services and interactive video to homes and businesses.

Like AMPS and PCS, a broadband wireless system will be a multi-cell distribution system operating in the allocated microwave band. Half of the allocation has been designated for television delivery, and half for telephone and data services. The large spectrum allocation provides an enormous potential bandwidth for telecommunications services. For instance, the article quoted above says the CellularVision system will have a capacity nearly 100 times that of AMPS-like cellular systems. On the other hand, there are some significant technical problems to resolve, notably the rain attenuation that occurs in the allocated frequency band.

The *class of providers* is the electrical power industry. The industry has developed a major incentive to deploy a two-way communications system, for which they will most likely use a technology akin to cable telephony — and, in fact, as suggested by early trials, even many of the same technology vendors identified previously for cable telepho-

135. *See*, e.g., Bossard, Bernard, "Get Ready for Cellular TV," *Telephone Engineer and Management*, August 15, 1993, at 51.

ny. The incentive is demand-side (that is, customer-controlled) load management, which is envisioned as substantially smoothing out the consumption of electrical power, thereby lessening the need for additional power generation plants. Such customer-controlled load management systems require an electrical utility to broadcast pricing information to its customers, and the customers to respond with purchase decisions the utility uses to determine power generation requirements in real time. Thus needing to deploy a two-way system, the utilities are pursuing the possibility of also providing telecommunications services over the same system.

3.12 Conclusion

This section has presented an analysis of the costs associated with alternative distribution technologies for providing telephone service. The analysis has positioned the various technologies in a common model, facilitating comparisons between them. Based on this work, we conclude that cable telephony appears to be the most promising technology from a capital expenditure standpoint at a reasonable penetration level[136]. After Chapter 4 presents results of a survey of telephone users, focussing in particular on their willingness to change service providers under various scenarios, Chapter 5 will utilize the results presented in this chapter and Chapter 4 as inputs to the business case analysis of alternative technologies.

Consistent with the remainder of the report, the focus of this chapter has been on the provision of telephone service. This has been done in order to provide a snapshot of the potential for competition in the local exchange marketplace as it exists today. Various alternative technologies may also be used to provide narrowband services other than voice, particularly Integrated Services Digital Network (ISDN) and switched and dedicated data services. The CoAccess system, for instance, can provide up to four lines per premises, and the signal to/from each line is carried on the network, and is presented to the switch, as either a 64 kbps or multiplexed higher-rate digital signal. Data communications can also be done over the forthcoming digital PCS service, and even over AMPS systems to the extent of using modems, although at the low speeds characteristic of analog voice transmission systems. The CAP fiber ring is, of course, able to provide high-speed digital circuits, up to rates as high as hundreds of Mbps.

At some point, the local exchange business will evolve to provide broadband, and then integrated broadband and narrowband, services. It does not appear at this point that wireless technologies will be suitable for such broadband services. On the other hand, cable television networks and fiber rings *already* support some forms of broadband services, and they should be able to maintain their position vis-a-vis the LECs as the market-

136. The business case analysis of the "full" cost of providing telephony on cable or PCS is contained in Chapter 5.

place evolves. CATV networks, which currently provide the dominant form of broadband telecommunications today (i.e., broadcast video), may be particularly well-positioned in this future marketplace. This could be true *provided* that alternative carriers are technologically, financially, and legally able to offer a full spectrum of telecommunications services, since that marketplace will demand the integrated provision of the full range of telecommunications services as a condition for market acceptance. Thus, ensuring the viability of competition for local telephone service today will be key to assuring an environment of robust competition in the broadband information superhighway of tomorrow.

4 | CONSUMER DEMAND FOR ALTERNATIVE LOCAL TELECOMMUNICATIONS SERVICES

The economic viability of alternative local telephone service providers is critically dependent upon customer willingness to switch to the new carriers. Market research conducted for this study, however, reveals a strong preference for the incumbent local exchange carrier. Technology assessments, such as that described in Chapter 3, provide information about the *supply* characteristics of alternative scenarios: Very little is, however, known about the potential consumer responses to such alternatives — the demand side.

Our objective was to gather information on specific aspects of consumer demand which would affect the capabilities of the cable TV and the alternative telco providers to enter the local loop market. In order to develop data about the potential *demand* for alternative services, a telephone survey of 1,203 residences nationwide was conducted in January, 1994. The survey dealt with subjects related to the level of effort that will be required for local service competitors of an LEC to achieve sufficient demand to cover costs. Data was gathered on the willingness of a customer to change local phone companies if the phone number must also be changed; the willingness of a customer to switch to a cable TV provider for local phone service, and attitudes toward the service quality of alternative vendors. Also investigated were general 'size of the market' questions dealing with video dial tone, interactive TV, video home shopping, and sophisticated work-at-home needs.

4.1 Satisfaction of customers with telephone and cable television services

The market opportunities facing competitive entrants to the local exchange telephone business will depend critically upon the interest of customers in considering alternative sources of service, and their willingness to switch carriers once a new service is available. Our survey examined some of the key ingredients of the potential market response to competitive local telephone service:

- The degree of satisfaction that customers currently feel toward their local telephone company and toward their local cable TV provider, which may be the most likely source of competing local telephone service;

- The underlying reasons for expressed levels of satisfaction: Service quality and value, responsiveness to customer concerns and needs, and so forth;

- Customer willingness to switch from a LEC to a cable telephony service under various conditions, including price differentials of 10% and 20%, and/or requirements to change telephone numbers and lose automatic directory listings;

- Customer willingness to take fixed (as distinct from mobile) basic telephone service from a wireless telephone company, with and without a 10% discount relative to the LEC's price; and

- The key concerns that would influence customers' potential decisions to switch local service carriers, such as price, customer service, quality of service, and the like.

In general, we found that people are significantly more satisfied with their local telephone company than with their local cable operator. Figure 4.1 provides insight into the disparity between expressed customer satisfaction with local and long distance telephone companies vs. their lower level of satisfaction with cable companies.[137] The results demonstrate that the cable companies will need to invest in personnel and resources to improve the level of customer satisfaction in order to be perceived on an equal footing with their potential LEC competitors.

Similarly, the respondents were asked to express their satisfaction (or lack of it) with various aspects of the services they presently receive from their LEC and cable TV companies — for example, the monthly charges, overall reliability of service, and prompt response to problems. The results from the responses to these questions are displayed in Figure 4.2. The survey indicates that consumers are more satisfied with their local telephone service than with their cable TV service.

In order to explore the issue of satisfaction in more detail, satisfaction levels were also evaluated on the basis of income and age. It appears that neither of these demographic characteristics affect satisfaction with the local telephone company. Satisfaction with the local telephone company remained in the low to mid 80% range regardless of income status. Similarly, satisfaction across age groups also did not deviate from about 80%. In fact, formal statistical tests show that neither of these attributes are directly correlated with percent of satisfaction.

137. The results related to satisfaction are tabulated from the 778 respondents who have cable television and who answered either "extremely satisfied" or "satisfied" to this question.

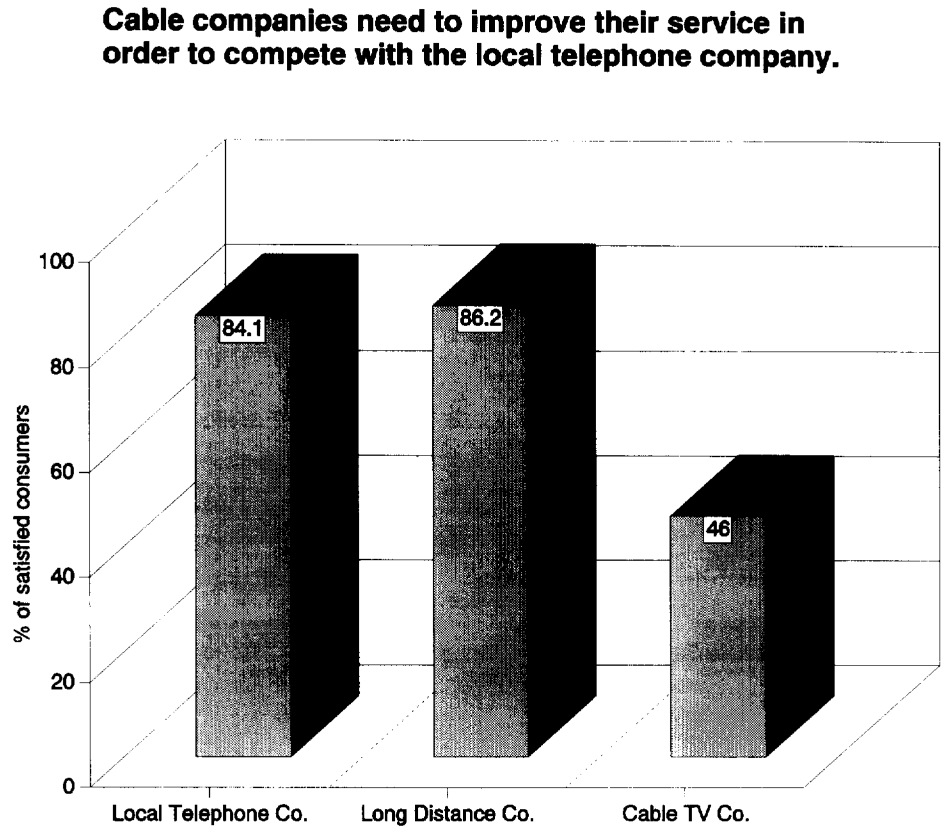

Figure 4.1. Customer satisfaction with service providers

However, this type of consistency was not demonstrated for cable television service. Respondent satisfaction with cable companies, analyzed with respect to age and income, reveals several interesting relationships. Among the respondents falling into the lowest income bracket, almost 60% are content as a result of their experience with their cable company. On the other hand, the high-income group only expresses 36% satisfaction. This segment of the market would presumably be a highly profitable target for the cable company to pursue, but will need to overcome certain adverse attitudes through increased advertising and more reliable service. The middle-aged group is the one most dissatisfied with their cable company. This group is an important one to be able to satisfy because its members are most likely to be heads of households, and thus are most likely to make decisions about subscribing to potential alternative local *telephone* service providers.

We also analyzed the survey responses to determine whether people with more than one telephone line or "high telephone bill" respondents were more (or less) likely to consider an alternative telephone company. Of those respondents who currently have more than one telephone line, there was no statistically significant evidence that they are more

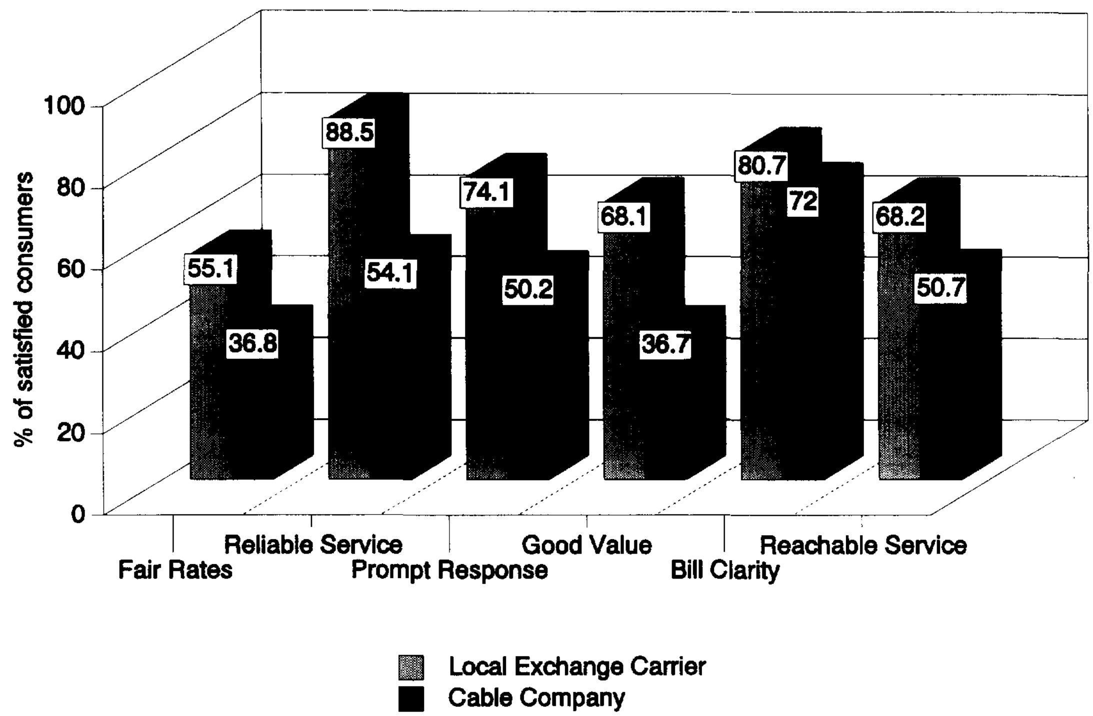

Figure 4.2. Customer perceptions of LEC and CATV services

satisfied with the cable company than households with only one telephone line. Similarly, preferences of households with high telephone bills do not differ from the average households.

These results would lead one to expect a general reluctance on the part of consumers to switch their local telephone service from their present provider to a cable-based service. Figure 4.3 demonstrates that only a small percentage of the population expressed a willingness to switch to a cable TV provider for their local telephone service. In addition to evaluating general willingness to switch, the survey was designed to gauge the importance of price as well as other possible impediments to switching, such as the necessity of changing telephone numbers or the lack of assurance that the customer's number will be listed in the principal local telephone directory.[138] The results shown on

138. These results were obtained from the complete sample. We also calculated the same results using just those people that have cable TV, but the outcome was analogous.

Figure 4.3 demonstrate that the inability to keep an existing telephone number or be assured of a listing in a centralized directory have a direct impact upon respondents' willingness to switch, and that although price concessions will overcome some of these sources of market inertia, there is still a strong disposition to maintain service with the existing service provider.

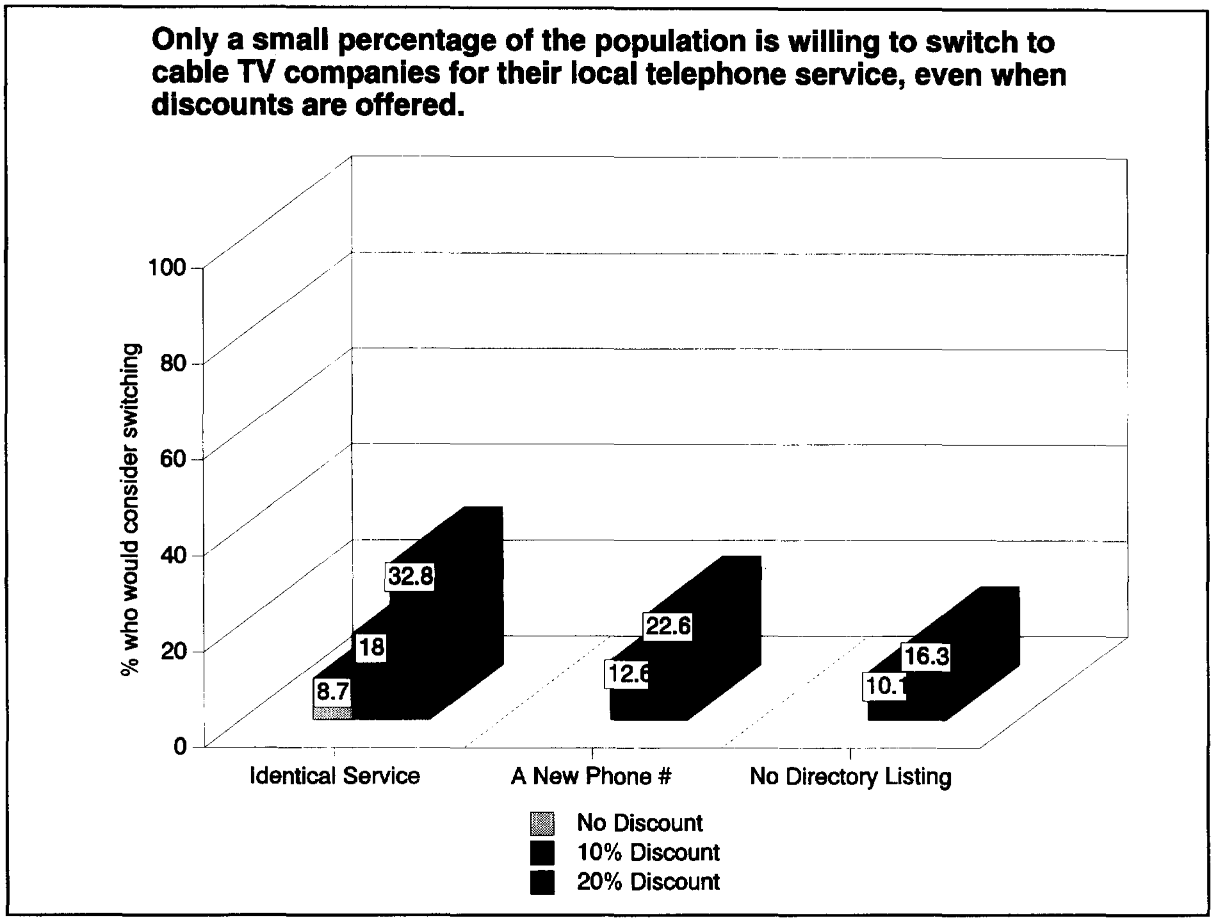

Figure 4.3. Customer interest in CATV-provided dial tone

4.2 Technology Profile of Consumers: What services do they buy, what equipment do they own?

A common assumption among many telecommunications industry executives, marketers, and forecasters is that consumers are actively "demanding" new services and capabilities, that they are intensely aware of the emerging technological and service options available to them, and that they will eagerly respond to new and innovative offerings of competing suppliers. Indeed, such assumptions supply much of the fuel that propels both the market and the policy initiatives for encouraging greater "competition" in the local telecommunications business: The perception is that customers are not getting what they want, and that only a competitive market can satisfy their needs.

The results of our survey, as demonstrated on Figure 4.4, show that, in theory, consumers do express a moderately strong interest in the types of new services that might be offered by a hybrid telephone/cable TV company. Further probing on the issue of technology adoption, however, reveals that this perception on the part of consumers probably represents an overly optimistic view and may not translate into actual demand in the future. Figure 4.5 demonstrates that actual consumer demand for most of the new residential features that have been offered by the incumbent local carriers to date has been relatively low.[139]

A final test of these assumptions examines the issue of consumer awareness of, and interest in, the types of services and capabilities that *are* readily available to them from sources *other than their existing telephone service providers.* Our survey asked consumers to identify various types of equipment and services that they currently own or use in their homes, and compared some of the results with a previous (1987) survey[140] to identify growth trends. Figure 4.6 demonstrates overall that consumer acceptance of non-LEC services is much higher than for most new telephone services and features.

139. The principal exceptions are touch tone and call waiting services, both of which exhibit high penetration rates. Both of these features, however, have been available to consumers for more than two decades. Newer and/or more sophisticated service features seem to evoke considerably lower levels of interest.

140. Data are taken from *1987 Home Media Consumer Survey: Cable Television*, Link Continuous Information Services Clients, 1988, pg 6.

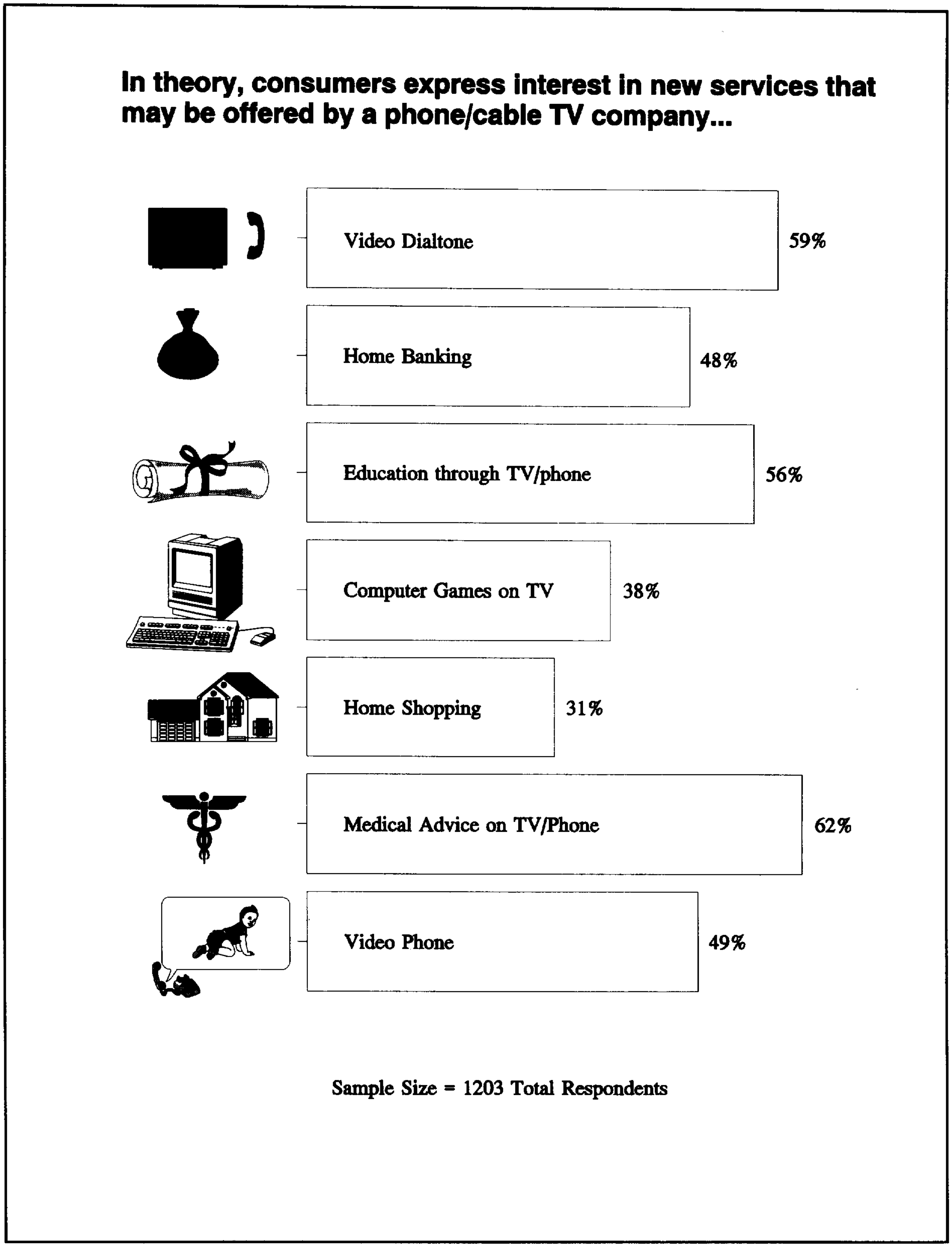

Figure 4.4. Consumer interest in advanced services

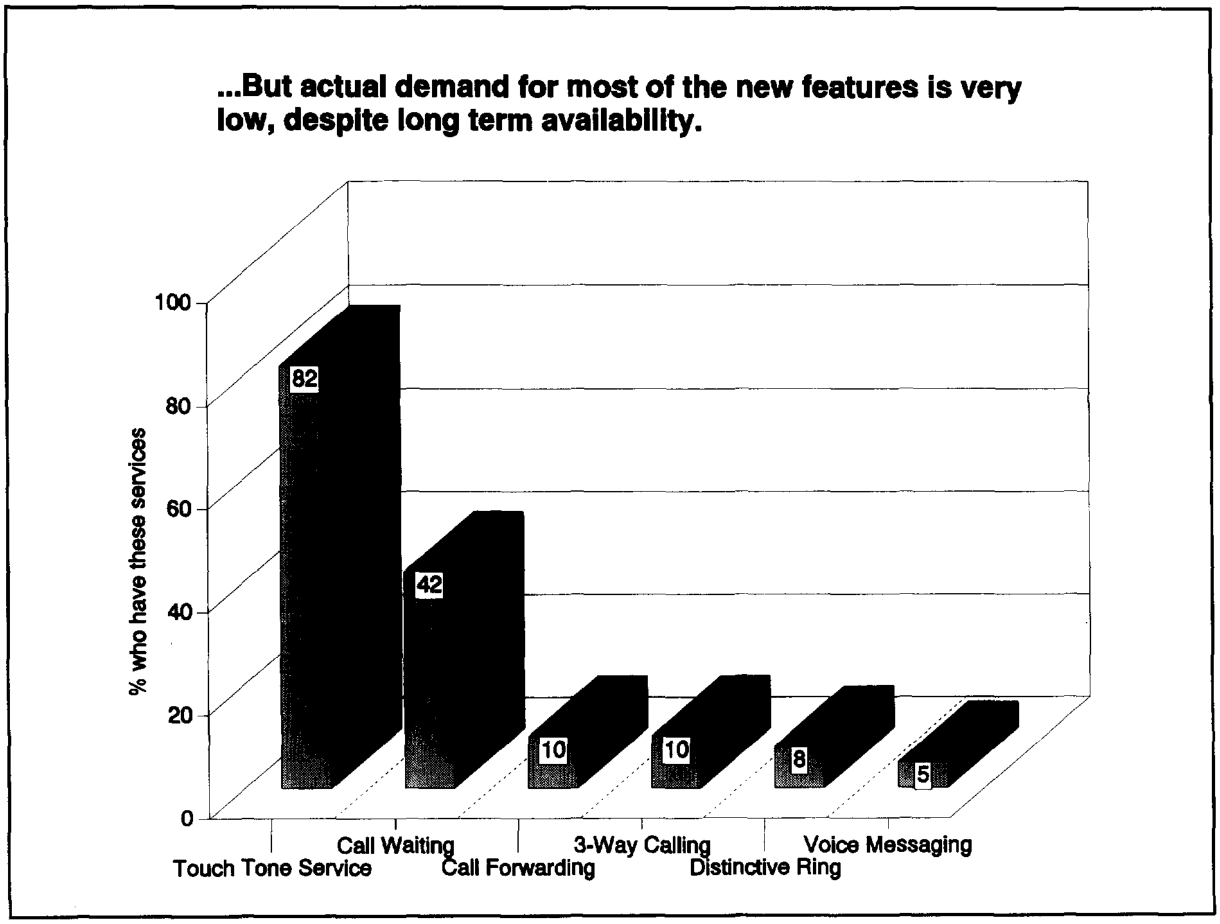

Figure 4.5. Demand for LEC vertical services

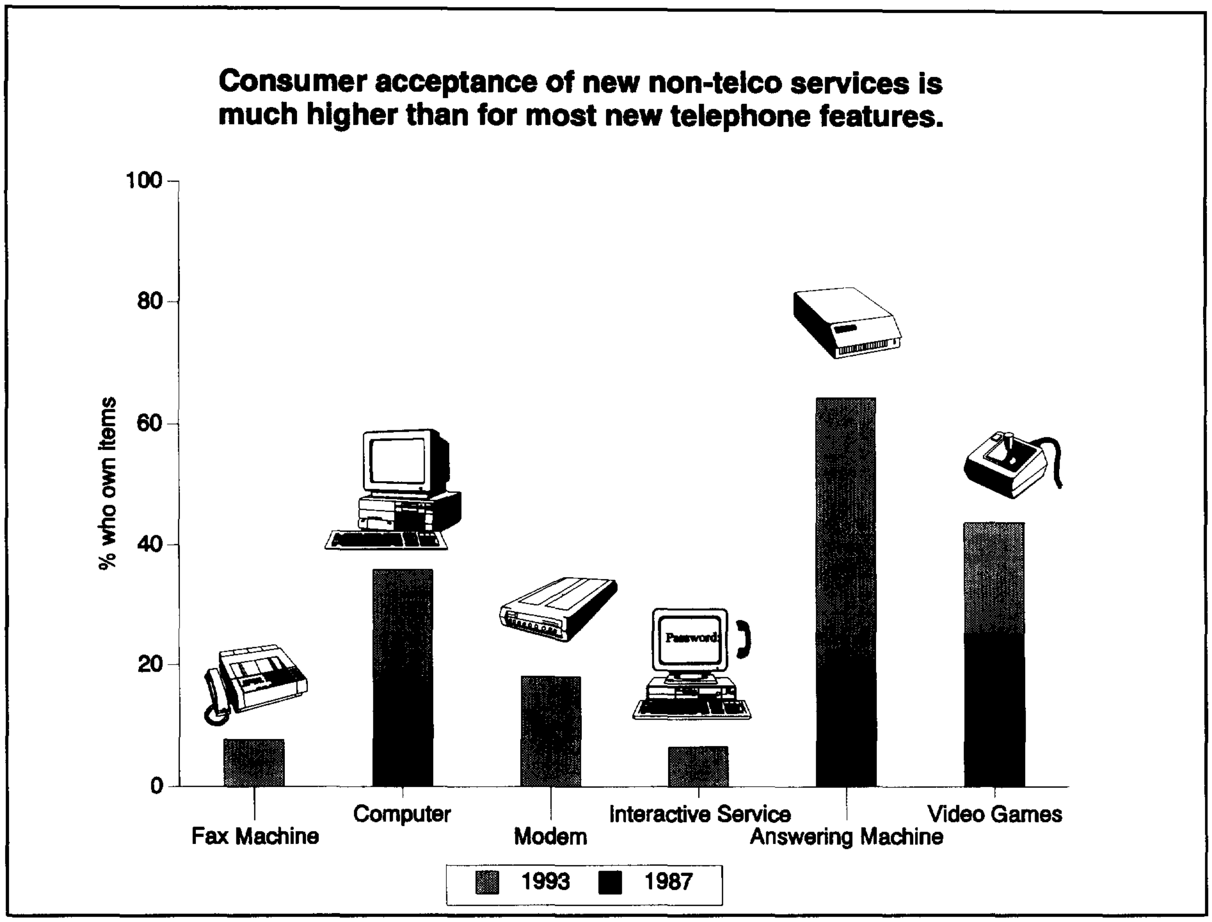

Figure 4.6. Consumer interest in new communications and information technology products

4.3 Interest in new and integrated services, wireless and "one-wire" solutions

A further dimension of the opportunity for competitive entry involves the possibility of new providers, such as cable TV companies, *combining* traditional telephone service with other communications capabilities, especially television-based functions such as video-on-demand ("video dial tone"), home shopping and banking, education, and so forth. Under this hypothesis, customer interest in these advanced capabilities might fuel a willingness to switch to a new carrier to obtain the full range of services from a single source. We asked specifically about customer interest in having a "one-wire" source for all of their home communications uses.

We questioned respondents relative to their interest in switching to a fixed "wireless" local service offering. Figure 4.7 demonstrates that hesitancy towards switching local service away from the LEC is not limited to offerings that would be provided by cable TV service companies. Overall interest in switching to a wireless company for local telephone service was only somewhat greater than for a cable company alternative.[141] We introduced the idea of a "wireless" company to the respondents, and asked how they felt

141. The question read: "In the future, new technologies could allow you to have cordless phones that don't connect to the telephone wires that come into your house. These would be similar to cordless phones but they would allow you to make calls from you car or from the grocery store or the local park or anywhere. If a company were to offer local phone service that used this new wireless technology at the same price you pay now, would you definitely, probably, probably not or definitely not consider purchasing your local telephone service from this company?"

about selecting this type of company for their fixed (non-mobile) basic local telephone service.

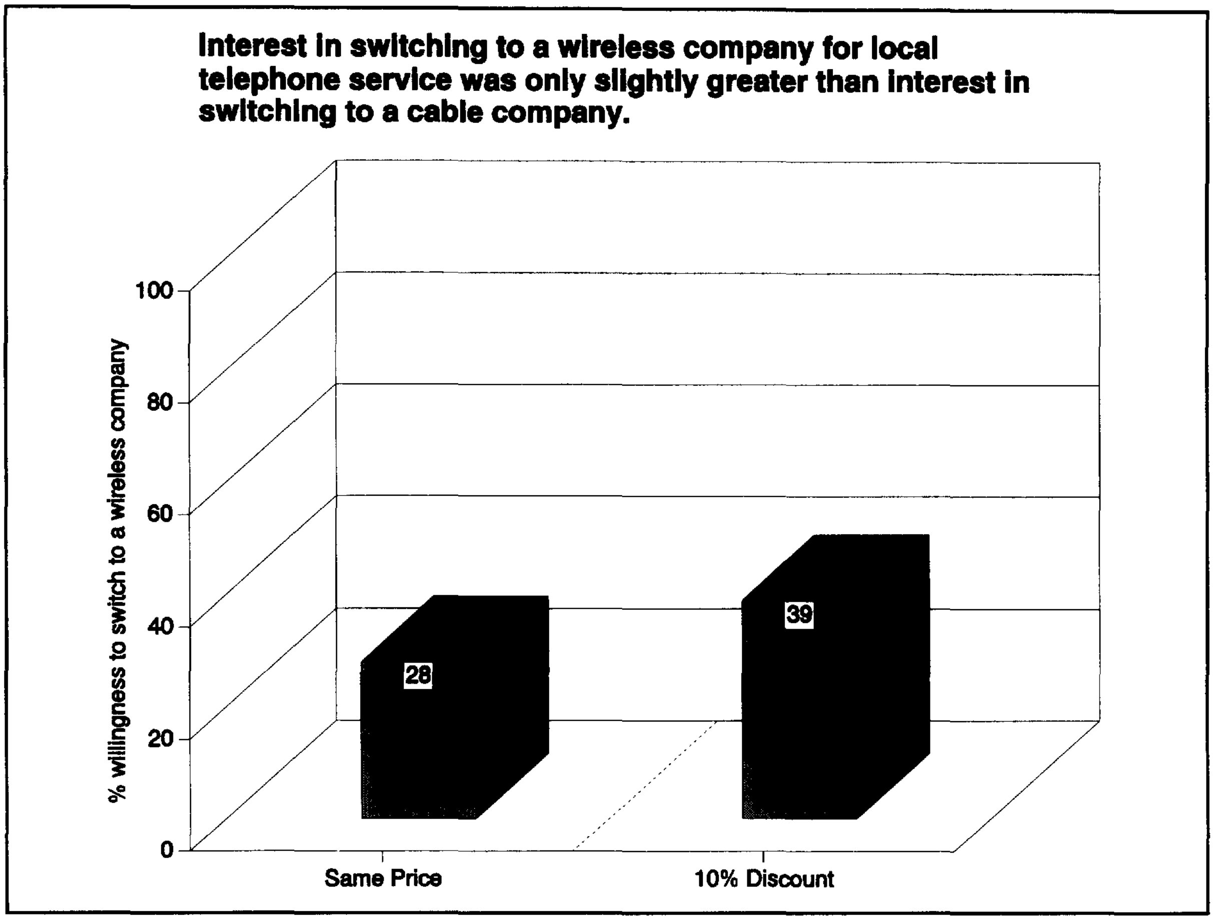

Figure 4.7. Consumer interest in fixed wireless dial tone service

In order to analyze the future prospects of providing video and telephony from the same company, the respondents were asked whether or not they would consider purchasing both services from the same company (i.e., a "one-wire" service).[142] Overall interest was relatively low. As shown in Figure 4.8, only 20.7% of respondents would consider

142. The question read: "At the present time, households receive their local telephone service from their local cable company, and they receive their cable TV through their local cable company. In the future, it may be possible for the same company to provide both local telephone service and cable services, as well as additional interactive services. Would you definitely, probably, probably not, or definitely not consider purchasing your local telephone service from a company able to provide both local phone and cable TV service?"

this opportunity.[143] Of those few consumers who would consider a "one-wire" service, most would prefer the incumbent local telephone company as the "one-wire" provider.

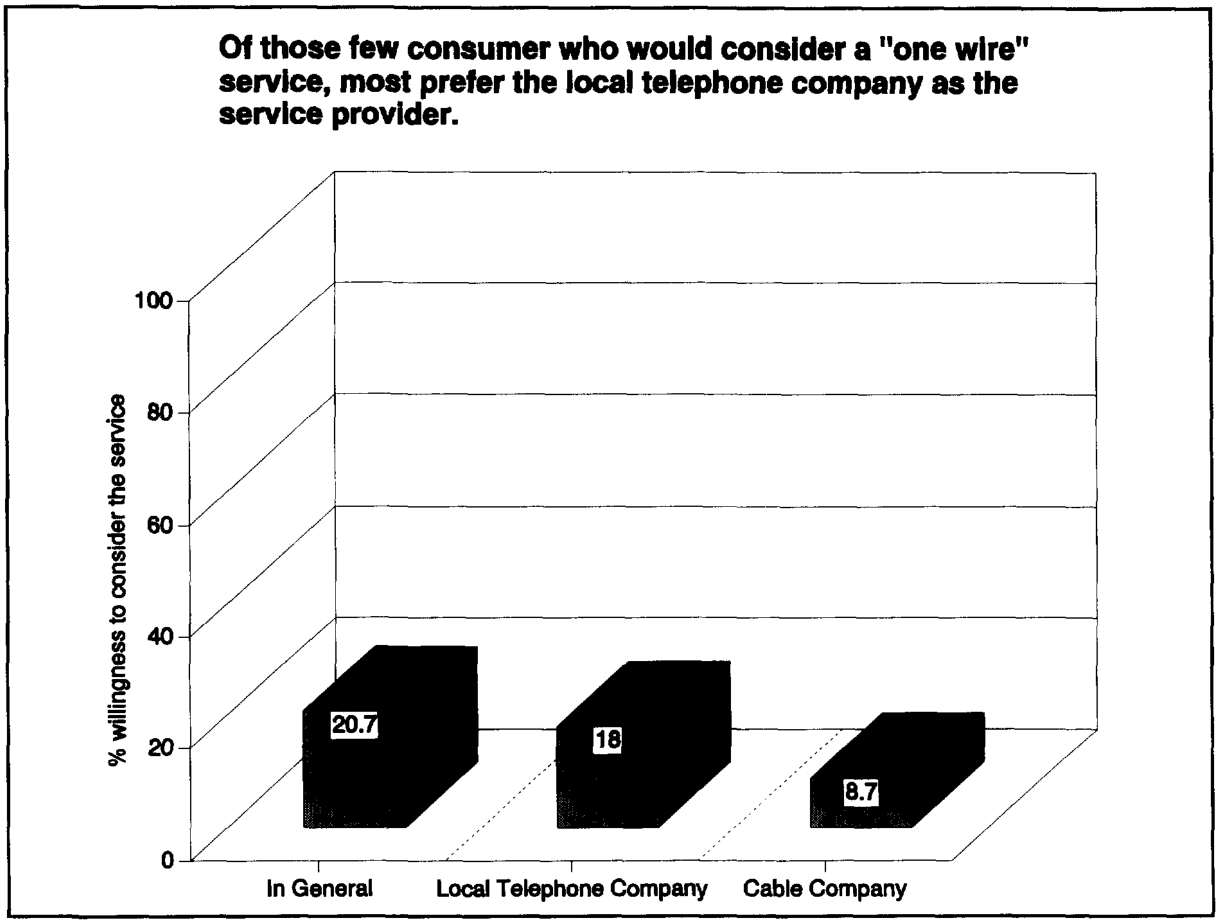

Figure 4.8. Consumer interest in "one-wire" service provider

Our survey results also provide practical evidence of the overall lack of interest on the part of respondents to switch their suppliers of local telephone service. After years of "equal access" and very active competition in the long distance market, about one-third of the sample indicated that they had ever switched long distance carriers. Given that switching to a new local service provider may involve potential difficulties (i.e., numbering, wiring, new equipment, physical installation of service at the customer's

143. These results were calculated using those who responded "definitely" to the question. If the "probably" responses were included, the percents were higher, for example 8.7% said they would definitely consider switching, while 45.3% said "definitely" or "probably." This reflects the vagueness of the answers with respect to "probably consider".